



New distribution records for Muscidae (Insecta: Diptera) in Latin America

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Abstract: The geographical distribution of Muscidae from Latin America has been extended. The following eight genera, including 28 species, were collected: *Cyrtoneurina* (2 spp.), *Cyrtoneuropsis* (8 spp.), *Dolichophaonia* (1 sp.), *Neomuscina* (7 spp.), *Ophyra* (1 sp.), *Phaonia* (2 spp.), *Philornis* (5 spp.), and *Polietina* (2 spp.). New records and additional collecting data have been provided for Brazil, Colombia, and Costa Rica, including reference maps for the species listed.

Key words: species list; distribution map; Muscidae; Neotropical region; South America

Flies belonging to the family Muscidae are distributed worldwide, with more than 5,200 species within 200 genera (Pape and Thompson 2013), of which approximately 850 species in 85 genera are known from the Neotropical region (Carvalho et al. 2005; Couri and Carvalho 2013). Muscidae occupy a wide range of environments, such as forested areas, including its edges, grasslands, wetlands and around water bodies, but avoid most arid environments (Carvalho et al. 2005). Several species are directly associated with humans, livestock farming, and crop cultivation. They are of ecological importance, because they act as decomposers, pollinators, predators, and prey for vertebrate and invertebrate insectivorous animals (Carvalho et al. 2005; Renaud et al. 2012.). The adults of this family are easily distinguishable from those of other Calyptratae families, based on the following combination of morphological characters: meron bare or with weak bristles (without forming a row of strong bristles); wing vein $A_1 + CuA_2$ not reaching the wing margin and not curved toward A_1 ; and scutellum bare on the ventral section (Gregor et al. 2002; Carvalho et al. 2005).

The group is relatively well studied, as compared to other Diptera. Several taxonomic studies, including

reviews of genera (Couri and Fernandes 2014) and tribe (Nihei and Carvalho 2007a) have been conducted, as well as phylogenetic studies, with molecular and morphological data (e.g., Haseyama and Carvalho 2012a; Haseyama et al. 2015). This previous knowledge makes the group an interesting subject for biogeographical studies, which have also been carried out extensively (Nihei and Carvalho 2007b; Löwenberg-Neto et al. 2009, 2011). A geographic database of Muscidae from Latin America and the Caribbean (Löwenberg-Neto and Carvalho 2013) was recently published, making the group even more suitable for different types of studies. The aim of this study was to update the distribution records of Muscidae in Latin America.

The species were collected from different locations in Latin America, by the authors and collaborators between the years 2006 to 2011. The most southern and northern collection points were Joinville (Santa Catarina, Brazil) and the Área de Conservación Guanacaste (Santa Rosa, Costa Rica), respectively. Collection methods used were an entomological net, a white sheet associated with a light source, and Malaise and modified Van Someren-Rydon (VSR) traps. Decaying organic material of both animal and vegetable origin was used as bait.

The specimens were identified in the laboratory using identification keys (Pamplona 1999; Carvalho 2002; Nihei and Carvalho 2007b; Haseyama and Carvalho 2012b; Pereira-Colavite and Carvalho 2012). Species identity was verified by comparison with exemplars available in the 'Padre Jesus Santiago Moure' Entomological Collection of the Department of Zoology at the Universidade Federal do Paraná (DZUP). The specimens were deposited in the same collection.

The survey revealed 36 new records of 28 species (Table 1) in eight genera from three subfamilies of Muscidae (*sensu* Haseyama et al. 2015): *Cyrtoneurina* (2 spp.), *Cyrtoneuropsis* (8 spp.), *Neomuscina* (7 spp.), and

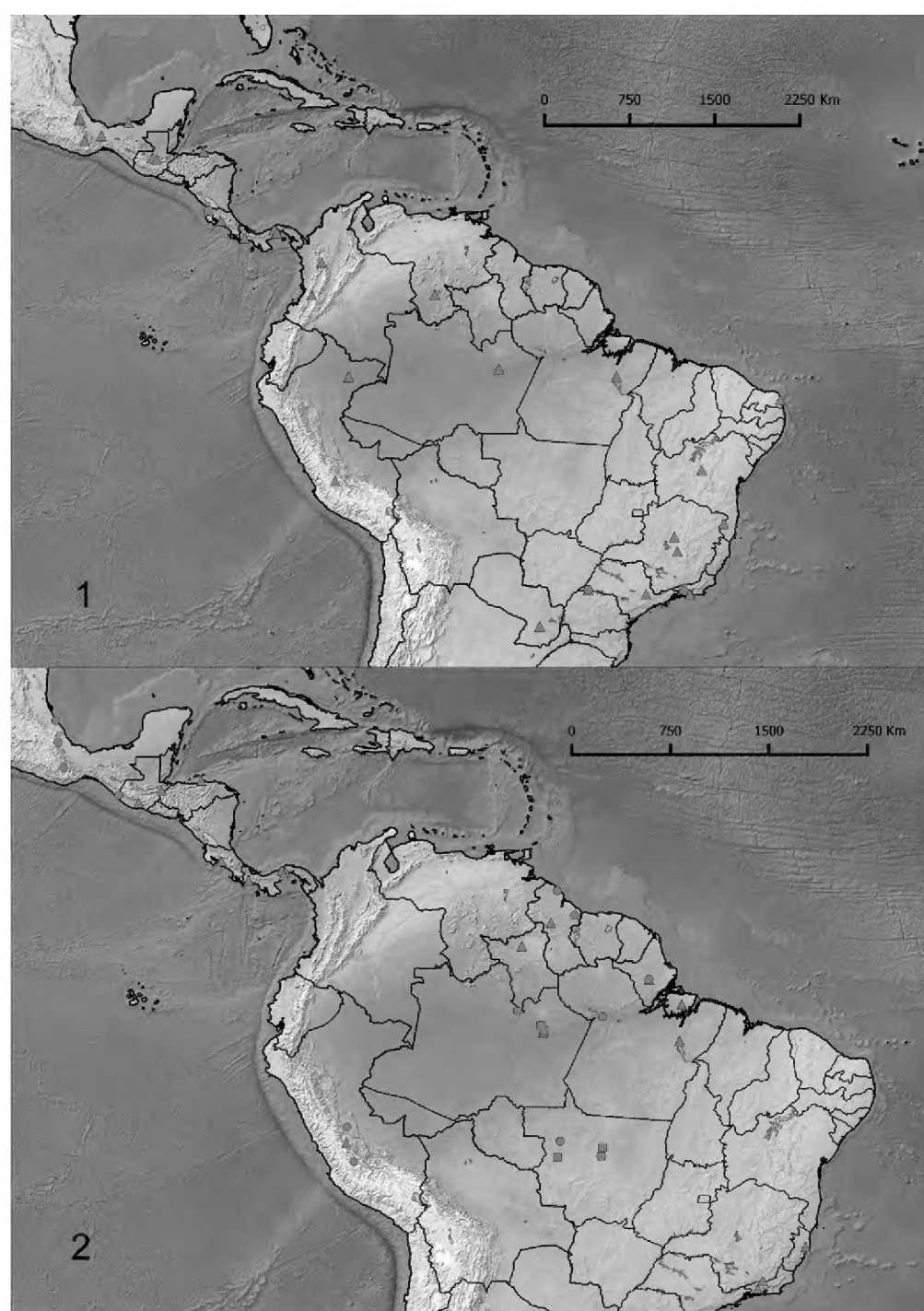
Table 1. List of species collected; N = number of samples; * new location recorded in Haseyama et al. 2015 without details of the collection dates, collector, or capture technique.

Species / voucher number	N	Date / Collector	Technique / Bait	Locality (voucher number)	New record for
<i>Cyrtoneurina alifusca</i> Couri, 1982	1	viii.16.2010 K. Haseyama	-	*Costa Rica, Santa Rosa, Area de Conservación Guanacaste (DZUP 341537)	Costa Rica; Central America
<i>Cyrtoneurina geminata</i> (Stein, 1904)	1	xi.05.2010 L. Wendt	VSR / banana and mango	Brazil, Amazonas, Manaus, INPA (DZUP 341608)	State of Amazonas
	1	viii.16.2010 K. Haseyama	-	*Costa Rica, Santa Rosa, Area de Conservación Guanacaste (DZUP 341538)	Guanacaste Province
<i>Cyrtoneuropsis armipes</i> (Stein, 1911)	3	ix. 26.2010 K. Haseyama, D. Cordeiro, M. Guedes, D. Grisales	Hand net	Brazil, Amazonas, Manaus, Reserva ZF2, -02.5933, -60.2116 (DZUP 341609)	Manaus Municipality
<i>Cyrtoneuropsis dubia</i> (Snyder, 1954)	1	x.30.2010 C. Maia, L. Santos	-	Brazil, Rio de Janeiro, Comendador Levy Gasparian, -21.9952, -43.3255 (DZUP 341610)	Comendador Levy Gasparian Municipality
<i>Cyrtoneuropsis flaviantennata</i> (Couri, 1982)	2	ix.23-26.2010 K. Haseyama, D. Cordeiro, M. Guedes, D. Grisales	Hand net	Brazil, Amazonas, Manaus, Reserva ZF2, -02.5933, -60.2116 (DZUP 341611)	State of Amazonas
	1	x.09-20.2006 J. Vidal, R. Ale-Rocha, G. Freitas	Malaise trap	Brazil, Amazonas, Manaus, Reserva Florestal Adolfo Ducke, north/south plateau (DZUP 341612)	
<i>Cyrtoneuropsis fuscicosta</i> (Curran, 1934)	10	ix.30-x.03.2010 K. Haseyama, D. Cordeiro, M. Guedes, D. Grisales	VSR / fish	Brazil, Amazonas, Presidente Figueiredo, -02.0174, -59.8267 (DZUP 341613)	Presidente Figueiredo Municipality
<i>Cyrtoneuropsis neotrita</i> (Snyder, 1954)	1	xii.26.2006-i.11.2007. G. Freitas, M. Feitosa	Malaise trap	*Brazil, Amazonas, Manaus, Reserva Florestal Adolfo Ducke, lest/west plateau (DZUP 341614)	State of Amazonas
	1	ix.23-26.2010 K. Haseyama, D. Cordeiro, M. Guedes, D. Grisales	VSR / fish	*Brazil, Amazonas, Manaus, Reserva ZF2, -02.5933, -60.2116 (DZUP 341543)	
<i>Cyrtoneuropsis paraescita</i> (Couri, 1995)	11	iv.06.2010 D. Cordeiro	-	Brazil, Santa Catarina, Joinville, BR-101, -26.4025, -48.8422, 20 m high (DZUP341615)	State of Santa Catarina
<i>Cyrtoneuropsis similata</i> (Couri, 1982)	2	19.viii.2010	VSR / feces	Colombia, Corregimiento El Arenal, 10.4489, -75.2723, 600 m high (DZUP 341616)	Colombia
	1	ii.14-iii.06.2007 G. Freitas, M. Feitosa	Malaise trap	Brazil, Manaus, Amazonas Reserva Florestal Adolfo Ducke, north/south plateau (DZUP 341617)	State of Amazonas
	1	ii.14-iii.06.2007 G. Freitas, M. Feitosa	Hang trap	Brazil, Manaus, Amazonas Reserva Florestal Adolfo Ducke, lest/west plateau, substore. (DZUP 341629)	
	1	x.10.2010 LEAq UFBA team	Light trap	Brazil, Bahia, Wenceslau Guimarães, Estação Ecológica de Wenceslau Guimarães, Serra Grande stream (DZUP 341630)	State of Bahia
<i>Cyrtoneuropsis veniseta</i> (Stein, 1904)	1	ix.21.2010 J. Almeida, L. Cezar, F. Fernandes, R. Kawada, S. Moraes	-	*Brazil, Pará, Óbidos. (DZUP 341547)	Óbidos Municipality
	1	01-12.viii.2009 R. Ale-Rocha, J. Vidal	Hag trap with yellow intercept	Brazil, Amazonas, São Gabriel da Cachoeira, Parque Nacional do Pico da Neblina (DZUP 341631)	São Gabriel da Cachoeira Municipality
<i>Dolichophaonia santoamarensis</i> (Albuquerque, 1958a)	1	xii.2008 LEAq UFBA team	Malaise trap	*Brazil, Bahia, Camacan, Complexo RPPN Serra Bonita, Chuchuzeiro stream, -15.3838, -39.5694 (DZUP 341582)	State of Bahia
<i>Neomuscina currani</i> Snyder, 1949	1	iv.03-06.2008 B. Ronchi-Teles	McPhail trap	*Brazil, Amazonas, São Gabriel da Cachoeira, LBA tower camp (DZUP 341549)	State of Amazonas
<i>Neomuscina goianensis</i> Lopes & Khouri, 1995	1	viii.25-ix.09.2009 R. Freitas-Silva, B. Monte, G. Freitas	Malaise trap	Brazil, Amazonas, Manaus, Reserva Campina, BR-174 km 43, -02.6007, -60.0602 (DZUP 341632)	State of Amazonas
	2	iii.06-16.2009 R. Freitas-Silva, B. Monte, G. Freitas			
	2	iii.27-iv.08.2009 F. Kirst, G. Freitas, Meneses, R. Freitas-Silva	Malaise trap	Brazil, Amazonas, Manaus, Reserva Silvicultura, BR-174 km 43, -02.6007, -60.0602 (DZUP 341633)	
	9	iv.03-06.2008 B. Ronchi-Teles	McPhail trap	*Brazil, Amazonas, São Gabriel da Cachoeira, LBA tower camp (DZUP 341550)	
	1	xii.10.2009, C. Kosmann	VSR / pork viscera	Brazil, Distrito Federal, Brasília, Estação Ecológica de Águas Emendadas (DZUP 341634)	Brasília, Federal District

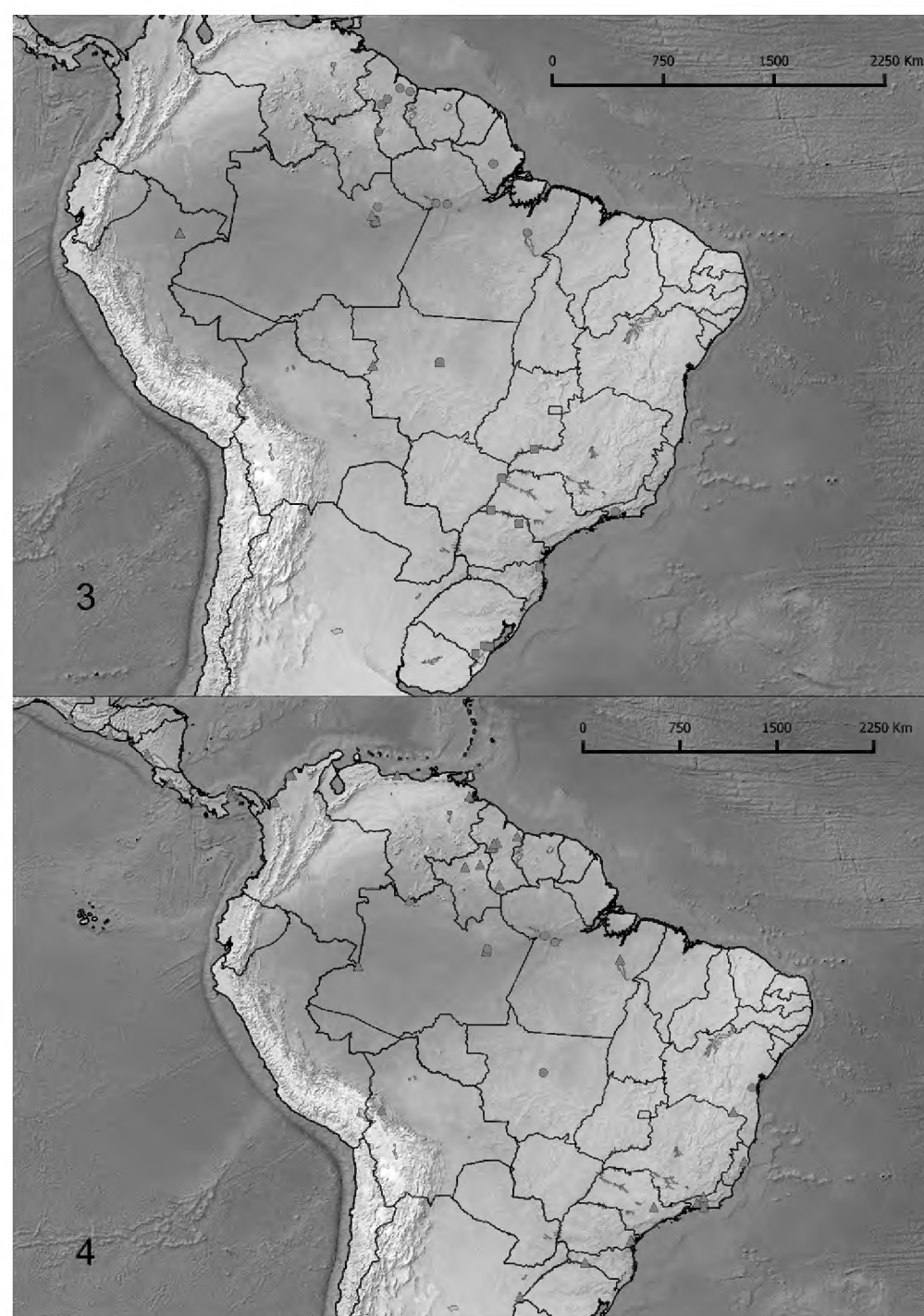
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Table 1. Continued.

Species / voucher number	N	Date / Collector	Technique / Bait	Locality (voucher number)	New record for
<i>Neomuscina neosimilis</i> Snyder, 1949	3	iii.27-iv.08.2009 F. Kirst, G. Freitas, Meneses, R. Freitas-Silva	Malaise trap	Brazil, Amazonas, Manaus, Reserva Silvicultura, BR-174 km 43, -02.6007, -60.0602 (DZUP 341635)	State of Amazonas
	6	iv.03-06.2008 B. Ronchi-Teles	McPhail trap	Brazil, Amazonas, São Gabriel da Cachoeira, LBA tower camp (DZUP 341636)	
	1	xi.03-05.2010. J. Almeida, G. Ide	VSR / banana	*Brazil, Minas Gerais, Marilândia, Parque Estadual Rio Doce, -19.7875, -42.5938 (DZUP 341552)	Marilândia Municipality
<i>Neomuscina pictipennis pictipennis</i> (Bigot, 1878)	2	iv.03-06.2008 B. Ronchi-Teles	McPhail trap	Brazil, Amazonas, São Gabriel da Cachoeira, LBA tower camp (DZUP 341637)	State of Amazonas
	1	iv.06-09.2008 B. Ronchi-Teles			
	5	xi.03-05.2010 J. Almeida, G. Ide	VSR / banana	Brazil, Minas Gerais, Marilândia, Parque Estadual Rio Doce, -19.7875, -42.5938 (DZUP 341638)	Marilândia Municipality
<i>Neomuscina similata</i> Snyder, 1949	1	iii.06-16.2009 J. Vidal, L. Wendt, R. Silva, R. Ale-Rocha	Malaise trap	Brazil, Amazonas, Manaus, Reserva Campina, BR-174 km 43, -02.6007, -60.0602 (DZUP 341618)	State of Amazonas
<i>Neomuscina stabilis</i> (Stein, 1911)	2	iii.27-iv.08.2009 F. Kirst, G. Freitas, Meneses, R. Freitas-Silva	Malaise trap	*Brazil, Amazonas, Manaus, Reserva Silvicultura, BR-174 km 43, -02.6007, -60.0602 (DZUP 341639)	State of Amazonas
	3	iii.06-16.2009 J. Vidal, L. Wendt, R. Silva, R. Ale-Rocha	Malaise trap	*Brazil, Amazonas, Manaus, Reserva Campina, BR-174 km 43, -02.6007, -60.0602 (DZUP 341554)	
<i>Neomuscina vitoriae</i> Lopes & Khouri, 1995	7	viii.18.2010	VSR / fruit	Colombia, Corregimiento El Arenal, 10.4489, -75.2723, 600 m high (DZUP 341640)	Colombia
<i>Ophyra solitaria</i> Albuquerque, 1958b	1	xi.20.2009 C. Kosmann	VSR / pork viscera	Brazil, Distrito Federal, Brasília, Estação Ecológica de Águas Emendadas (DZUP 341641)	Brasília, Federal District
<i>Phaonia grajauensis</i> (Albuquerque, 1957)	1	iv.20.2009 D. Grisales, L. Santos, M. Guedes, K. Haseyama	Malaise trap	Brazil, Paraná, Antonina, Reserva Morro da Mina (DZUP 311642)	Antonina Municipality
<i>Phaonia lentiginosa</i> Snyder, 1957	1	ix.01.2010 P. Grossi		Brazil, Paraná, Tijucas do Sul, Araçatuba hill, -25.8997, -49.0096, 1200 m high (DZUP 311643)	Tijucas do Sul Municipality
<i>Philornis aitkeni</i> Dodge, 1963	2	xi.20.2009 C. Kosmann	VSR / pork viscera	Brazil, Distrito Federal, Brasília, Estação Ecológica de Águas Emendadas (DZUP 311644)	Brasília, Federal District
<i>Philornis downsi</i> Dodge & Aitken, 1968	1	iii.27-iv.08.2009 F. Kirst, G. Freitas, Meneses, R. Freitas-Silva	Malaise trap	*Brazil, Amazonas, Manaus, Reserva Silvicultura, BR-174 km 43, -02.6007, -60.0602 (DZUP 341512)	State of Amazonas
<i>Philornis falsificus</i> Dodge & Aitken, 1968	2	ix.23-26.2010 K. Haseyama, D. Cordeiro, M. Guedes, D. Grisales	VSR / fish	*Brazil, Amazonas, Reserva ZF2, -02.5933, -60.2116 (DZUP 341513)	State of Amazonas
<i>Philornis niger</i> Dodge & Aitken, 1968	1	iii.06-16.2009 J. Vidal, L. Wendt, R. Silva, R. Ale-Rocha	Malaise trap	*Brazil, Amazonas, Manaus, Reserva Campina, BR-174 km 43, -02.6007, -60.0602 (DZUP 341514)	State of Amazonas
<i>Philornis zeteki</i> Dodge, 1963	5	xi.20.2009 C. Kosmann	VSR / pork viscera	*Brazil, Distrito Federal, Brasília, Estação Ecológica de Águas Emendadas (DZUP 341515)	Brazil
<i>Polietina bicolor</i> Albuquerque, 1956	1	iii.27-iv.08.2009 F. Kirst, G. Freitas, Meneses, R. Freitas-Silva	Malaise trap	*Brazil, Amazonas, Manaus, Reserva Silvicultura, BR-174 km 43, -02.6007, -60.0602 (DZUP 341566)	State of Amazonas
<i>Polietina orbitalis</i> (Stein, 1904)	1	viii.13-16.2010 K. Haseyama	Malaise trap	*Costa Rica, Santa Rosa, Area de Conservación Guanacaste (DZUP 341568)	Costa Rica; Central America
	1	iv.22-24.2009 R. Freitas-Silva	Malaise trap	*Brazil, Amazonas, São Gabriel da Cachoeira, Parque Nacional do Pico da Neblina (DZUP 341569)	State of Amazonas



Figures 1–2. Known collection sites for *Cyrtoneurina* and *Cyrtoneuropsis*. **1:** Circles = *Cyrtoneurina alifusca*; triangles = *Cyrtoneurina geminata*. **2:** Circles = *Cyrtoneuropsis armipes*; triangles = *Cyrtoneuropsis dubia*; squares = *Cyrtoneuropsis flaviantennata*. Blue symbols are previously known records (Löwenberg-Neto and Carvalho 2013), and red symbols are new records reported in this article.



Figures 3–4. Known collection sites for *Cyrtoneuropsis*. **3:** Circles = *C. fuscicosta*; triangles = *C. neotrita*; squares = *C. paraescita*. **4:** Circles = *C. similata*; triangles = *C. veniseta*. Blue symbols are previously known records (Löwenberg-Neto and Carvalho 2013), and red symbols are new records reported in this article.

Philornis (5 spp.) (Cyrtoneurinae); *Polietina* (2 spp.) and *Ophyra* (1 sp.) (Muscinae); *Phaonia* (2 spp.) (Mydaeinae) and *Dolichophaonia* (1 sp.) (Muscidae incertae sedis). Of these, two records are new for Central America, five for Latin American countries, 22 for Brazilian states or equivalent units in other countries, and nine for Brazilian municipalities (Table 1). All comments on the previously known distribution of the species refer to the data of Löwenberg-Neto and Carvalho (2013), except where mentioned otherwise.

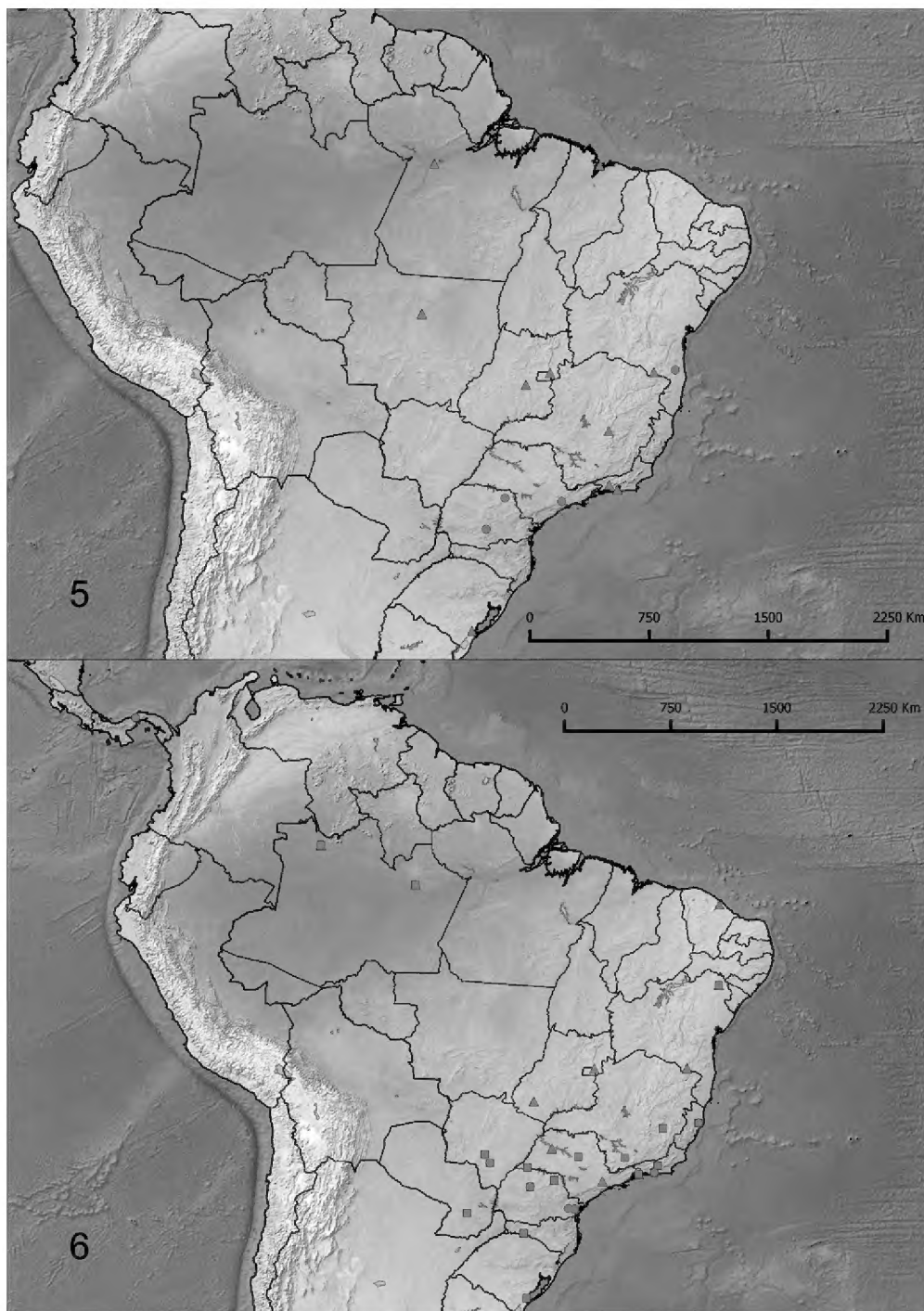
Cyrtoneurina alifusca Couri, 1982 was previously found only in Brazil and Paraguay (Schühli et al. 2011), where the northernmost record was from the state of Rio de Janeiro (Brazil). Its known distribution has now been extended to Central America (Costa Rica). *Cyrtoneurina geminata* (Stein, 1904) had not previously been recorded in the state of Amazonas (Brazil). Previously, only a single record was available for the Amazonian region (Tucuruí, state of Pará). There was also only a single record for Costa Rica (Figure 1).

Cyrtoneuropsis flaviantennata (Couri, 1982) had been

previously collected only in the state of Mato Grosso, Brazil. The first records of the species in the state of Amazonas are presented in this study (Figure 2). *Cyrtoneuropsis neotrita* (Snyder, 1954) was recorded in three Brazilian states (Rondônia, Mato Grosso and Rio de Janeiro), to which the state of Amazonas has now been added (Figure 3). *Cyrtoneuropsis paraescita* (Couri, 1995) had been collected in Goiás, Mato Grosso do Sul, São Paulo, Paraná and in Rio Grande do Sul (Brazilian states), and the first record in the state of Santa Catarina, Brazil, is presented here (Figure 3). *Cyrtoneuropsis similata* (Couri, 1982) had a known distribution limited to two Brazilian states (Mato Grosso and Pará). In the present study, its distribution was expanded to Colombia, and to the Brazilian states of Amazonas and Bahia (Figure 4).

Dolichophaonia santoamarensis (Albuquerque, 1958a) was known only from the Brazilian states of Paraná and São Paulo. In the present study, the first record in the state of Bahia was recorded (Figure 5).

Neomuscina currani Snyder, 1949, *N. goianensis* Lopes & Khouri, 1995, *N. neosimilis* Snyder, 1949, *N. pictipennis*

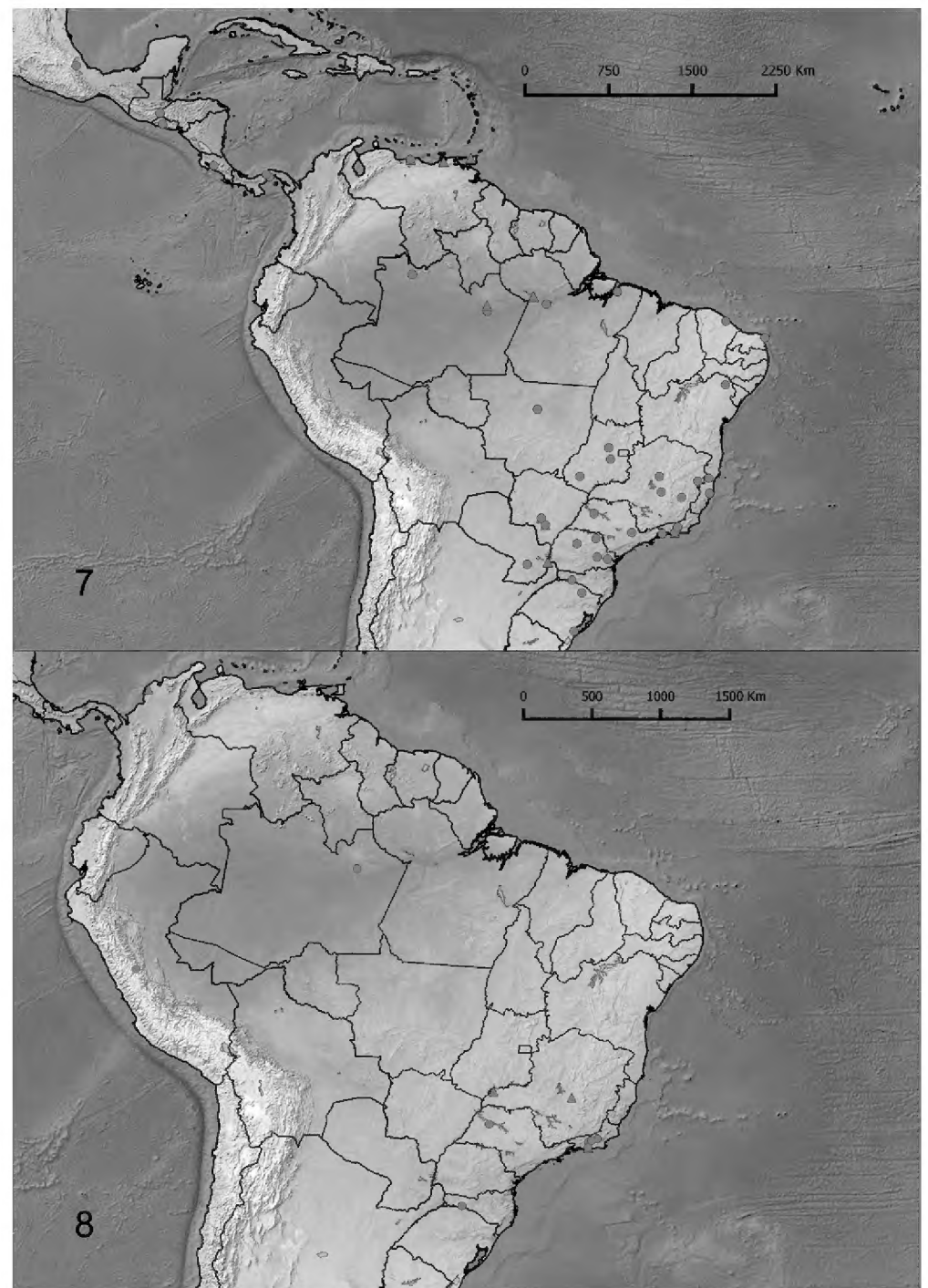


Figures 5–6. Known collection sites for *Dolichophaonia*, *Ophyra* and *Neomuscina*. **5:** Circles = *D. santoamarensis*; triangles = *O. solitaria*. **6:** Circles = *Neomuscina currani*; triangles = *N. goianensis*; squares = *N. neosimilis*. Blue symbols are previously known records (Löwnberg-Neto and Carvalho 2013), and red symbols are new records reported in this article.

pictipennis (Bigot, 1878), *N. similata* Snyder, 1949 and *N. stabilis* (Stein, 1911) have been collected in several Brazilian states, but not in the state of Amazonas until now. *Neomuscina goianensis* was also found for the first time in Brasília, Federal District. *Neomuscina vitoriae* Lopes & Khouri, 1995 had a known distribution in the states of Minas Gerais and Rio de Janeiro, Brazil. Here, the first record for Colombia is presented (Figures 6–8).

Phaonia grajauesis (Albuquerque, 1957) has been collected in the Brazilian states of Mato Grosso do Sul, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina and São Paulo, while *P. lentiginosa* Snyder, 1957 has been collected in Paraná, Rio de Janeiro and Santa Catarina states. One new record for each species in Paraná was recorded (Figure 9).

The northernmost record of *Philornis downsi* Dodge & Aitken, 1968 in Brazil was in Dourados, Mato Grosso do Sul. We collected a specimen in Manaus, Amazonas, extending its range to the Amazon region (Figure 10). There are few records of *P. niger* Dodge & Aitken, 1968, and the only Brazilian record was in the state of Pernambuco. The new specimen collected in Amazonas



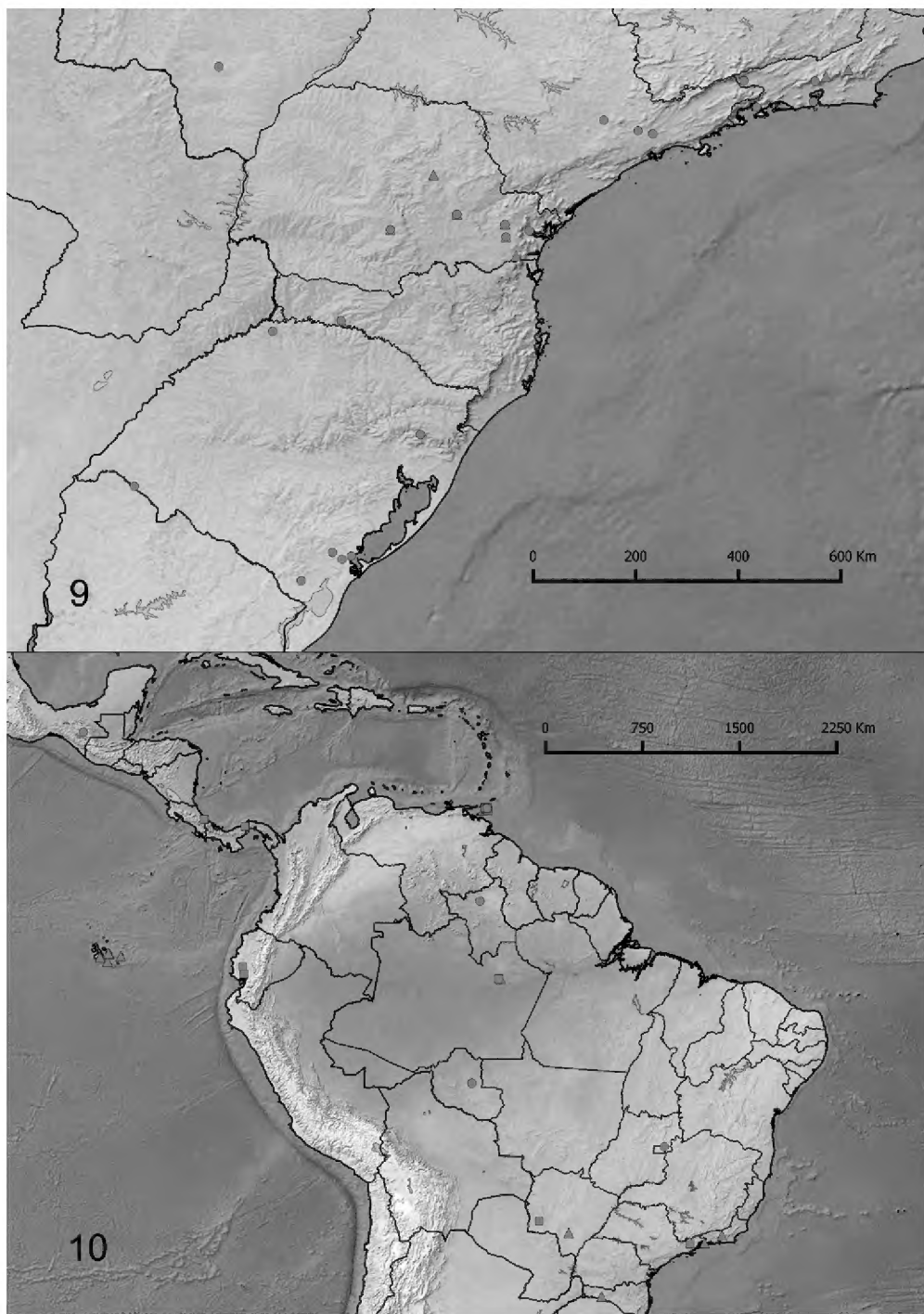
Figures 7–8. Known collection sites for *Neomuscina*. **7:** Circles = *N. pictipennis*; triangles = *N. similata*. **8:** Circles = *N. stabilis*; triangles = *N. vitoriae*. Blue symbols are previously known records (Löwnberg-Neto and Carvalho 2013), and red symbols are new records reported in this article. Specimens of *N. pictipennis*, which the new records in this article refer to, have been identified to subspecies, *N. pictipennis pictipennis*. However, no information was available about the distribution of the subspecies, thus the map includes the distribution points known for the species.

is important because it is from a different biogeographic region (Figure 11). *Philornis niger* and *P. falsificus* Dodge & Aitken, 1968 were known only in one and two Brazilian states, respectively, and have now been found in the state of Amazonas. *Philornis zeteki* Dodge, 1963 was previously known only in a single location in Panama, to which Brasília, Federal District, Brazil, has now been added (Figure 11).

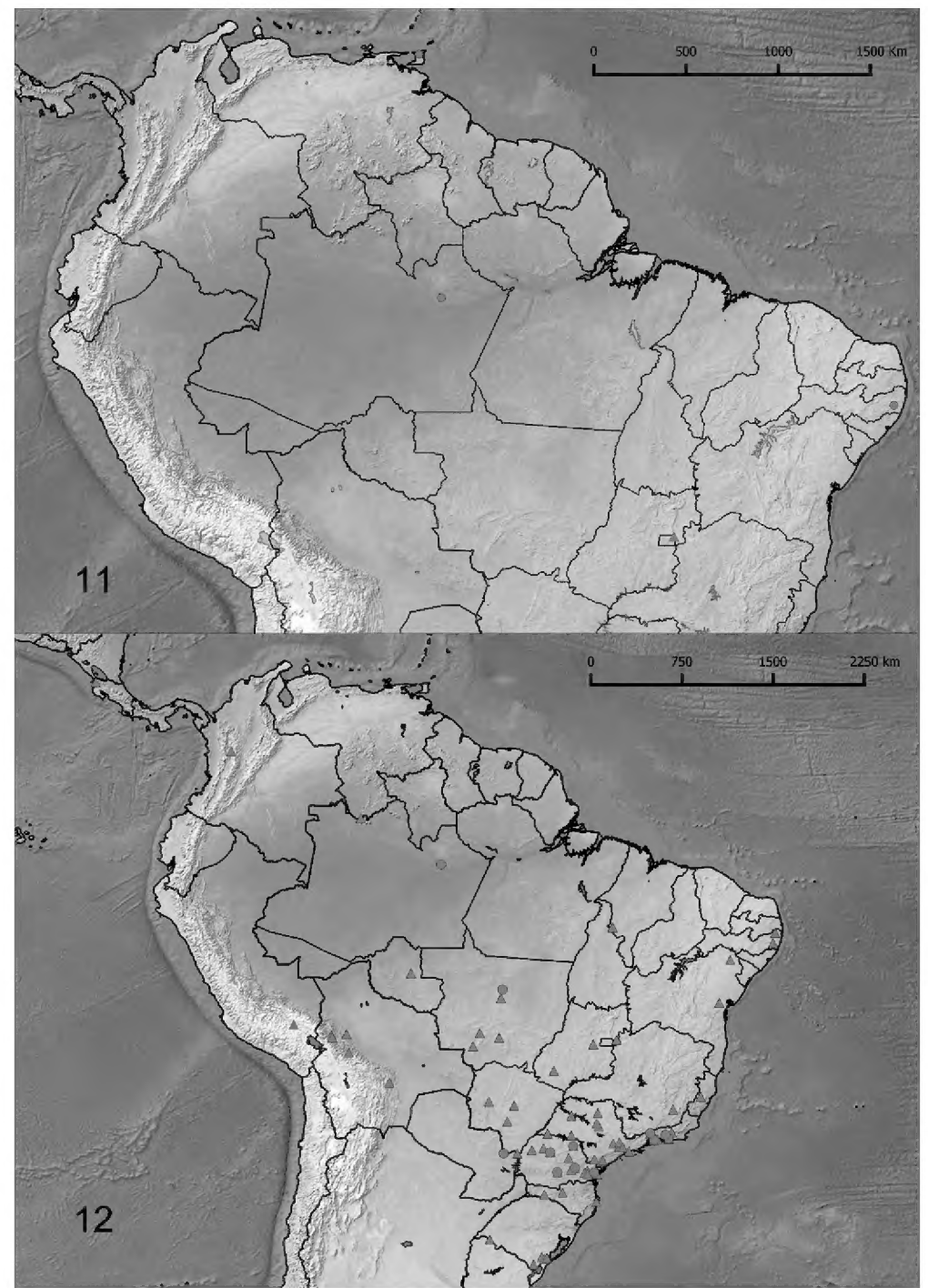
Polietina orbitalis (Stein, 1904) is a common species that is widely distributed in South America, from Argentina to Colombia. Its first occurrence in the state of Amazonas, Brazil, and Central America, Costa Rica, was recorded in this study (Figure 12).

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Figures 9–10. Known collection sites for *Phaonia* and *Philornis*. **9:** Circles = *Phaonia grajauensis*; triangles = *Phaonia lentiginosa*. **10:** Circles = *Philornis aitkeni*; triangles = *Philornis downsi*; squares = *Philornis falsificus*. Blue symbols are previously known records (Löwnberg-Neto and Carvalho 2013), and red symbols are new records reported in this article.



Figures 11–12. Known collection sites for *Philornis* and *Polietina*. **11:** Circles = *Philornis niger*; triangles = *Philornis zeteki*. **12:** Circles = *Polietina bicolor*; triangles = *Polietina orbitalis*. Blue symbols are previously known records (Löwnberg-Neto and Carvalho 2013), and red symbols are new records reported in this article.

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